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GB 2309565 A GB 2305216 A GB 2297356 A
GB 2291235 A US 5742227 A US 5448218 A

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(54) Abstract Title
Remote immobilisation of moving powered vehicles

(57) A system to achieve the disablement of moving stolen vehicles by remote means addresses e.g. a paging receiver in the vehicle by radio, causing a reduction of power delivered to propel the vehicle, e.g. by modifying the signal from the air flow sensor A.F.S to the engine control unit E.C.U. Successive pager calls cause successive reductions of power (or one call may be sufficient to cause progressive reduction of power) for safe speed reduction.

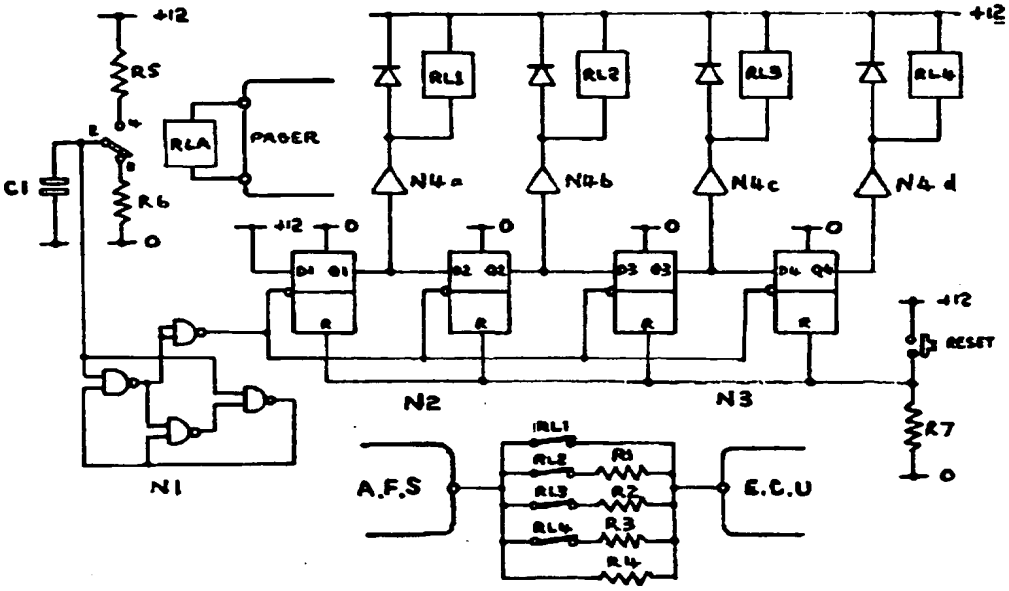

Fig.4

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Fig. 1

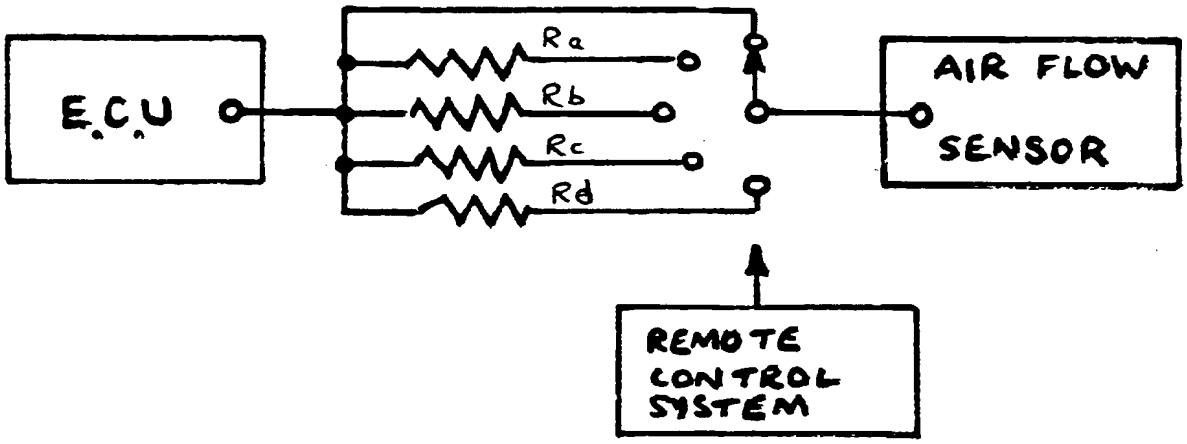


Fig.2

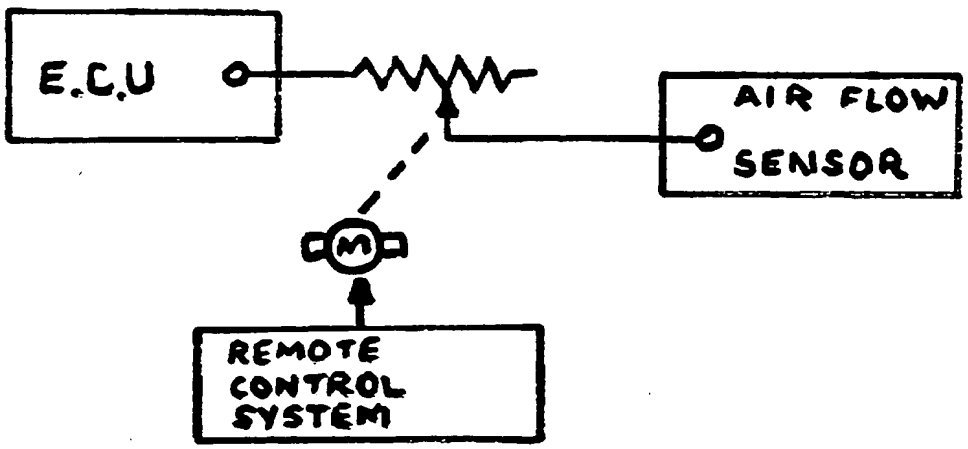


Fig.3

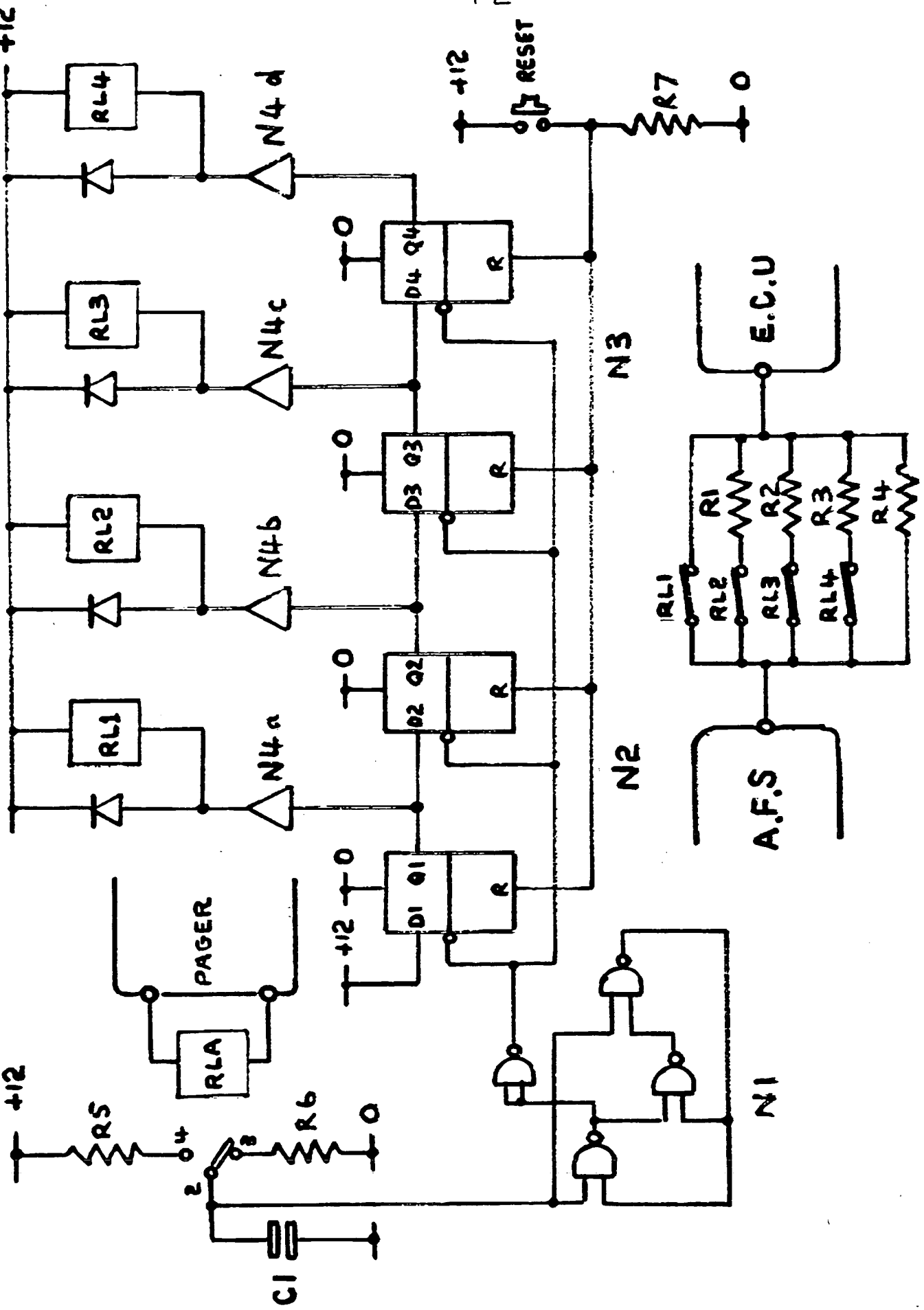


Fig.4

THE REMOTE IMMOBILISATION OF MOVING POWERED VEHICLES

This invention relates to the remote disabling of powered vehicles.

The high occurrence of v ehicles, particularly motor cars, being stolen and driven off has prompted a number of schemes to assist their retrieval. However, such schemes, usually relying on tracking the position of the vehicle involving for example the satellite Global Positioning System, are complex and expensive, and do not in themselves provide a physical means of halting the vehicle.

The present invention provides for the remote disabling of vehicles fitted with facilities according to the invention to achieve either a sudden or gradual disablement as appropriate to safe operation of the type of vehicle or vessel involved.

The present invention provides a cheap and reliable method utilizing an addressable radio system, such as the well established, robust and relatively inexpensive electronic paging system provided by a number of operators or the SMS service provided by digital telephone systems. These systems have wide land and coastal coverage. Preferably the output of a pager receiver activates a mechanism to provide a total or progressive degree of immobilization of the host vehicle when required by the vehicle owner or the police. A further preferred objective of the invention is to achieve the immobilization of the vehicle, which may be in a high traffic density, high speed environment, in a safe manner, which requires a progressive reduction in speed but avoiding methods potentially dangerous to the occupants and surrounding vehicles such as remote full application of brakes. Accordingly the invention provides a means of progressively reducing the power delivered to propel the vehicle, over a period of time to allow the driver to adjust to surrounding circumstances, for example for modifying sensor signals supplied to an electronic control unit (ECU) of the vehicle.

System security is provided by the unique and private nature of the six to eleven digit telephone access code of the pager which must be kept secret by the authorised user(s).

A specific embodiment of the invention will now be described by way of example, as applied to a fuel injected petrol engine.

In a modern fuel injected engine, fuel is injected into the inlet manifold in calculated amounts under the control of an engine control unit (ECU). To achieve these calculations a variety of engine parameters are monitored including revolution rate, throttle position and intake air flow. Air flow sensors take a variety of forms, but are generally based on two techniques. The hot wire system determines air flow by utilizing the relationship between the air flow rate and the cooling effect of that air passing over a hot wire. In the second technique, the air intake passes through a chamber in which the position of a flap relates directly to the air flow. The position of the flap is converted to an electrical analogue. In each case an electrical signal is passed to the ECU the value of which represents the air flow. The ECU calculates and controls the time for which the injector valves are open thereby matching the fuel supply to the measured air flow value and other related factors.

Accordingly the invention provides in this embodiment for the automatic substitution of a stepped variation in value which progressively introduces a value calculated to produce a lower fuel injection rate and a concommitant reduction in power, thereby achieving a consequential reduction in road speed, irrespective of throttle position. Although increases in speed are temporarily available by selection of lower gears, again facilitating the short term needs of the driver to adjust safely to traffic conditions in the slow down process, these high speeds cannot be sustained as further reductions of engine power are introduced. In the described embodiment example of the invention, the reduction of power is applied in a stepped manner triggered by the repeated pager receiver communication cycle occurring typically once every two minutes.

As an additonal warning to the driver and surrounding vehicles the hazard lights are caused to activate on receipt of the first message communication to the pager. Other visual or audible warnings including synthesised voice messages may be activated in the same manner

The method by which the air flow sensor value is modified in this embodiment is now described, with reference to the accompanying drawing in which:-

Figure 1 shows the normal direct connection from the air flow sensor to the engine control unit;
Figure 2 shows the introduction of a remotely controlled variation in resistance between the air flow sensor and the engine control unit;
Figure 3 shows an alternative remotely started motorized method of resistance variation; and
Figure 4 shows the details of the remote control system employing an electronic pager and additonal switching electronics.

Refering to figure 1, in the normal operating condition of a known engine, a direct connection is made between the air flow sensor output and the appropriate input to the ECU.

In this embodiment and referring to Figure 2, the remote control system causes the functional equivalent of a rotary switch to step from the normal (directly connected) position to introduce a resistance Ra into the circuit which is calibrated to achieve a reduction in engine power equivalent to a nominal maximum speed in 5th gear of 70 mph. At a convenient later time, the remote control system causes a further step to introduce resistor value Rb, calibrated to achieve a further reduction in engine power equivalent to a nominal maximum speed in 4th gear of 50 mph. This process is repeated at subsequent times to achieve the progressive introduction of Rc and then Rd corresponding respectively to nominal maximum speeds of 30 mph in 3rd gear and 10 mph in lst gear. Further steps could in principle be included.

Alternatively a similar increase in resistance could be introduced over a predetermined period of time activated by a motorized drive controlling a potentiometer initiated by the pager receiver output. Fig. 3 refers.

A particular embodiment of the remote control system will now be described, referring to fig. 4.

The electronic pager and additional control electronics is concealed within the body of the vehicle.

The authorised user calls the pager operator in the usual manner over the public telephone system using the unique pager number.

The pager operator causes the pager receiver to activate for the first time after a short delay.

The pager receiver is completely standard except that the voltage generated to drive the audio or vibratory calling alarm is in this example applied to a sensitive low voltage relay RLA.

The combination of R5, R6, C1 serve to compensate for RLA contact bounce. The transition of RLA armature from contact 3 to contact 4 applies +12 v to the logic gate combination N1. This combination is arranged to provide a single narrow positive pulse (clock) to the D type register chain composed of N2 and N3.

Initially the Q outputs of all 4 D type registers are [O] having been reset previously. On the first receipt of the pager output the clock from N1 transfers the [1] on the D1 input to the Q1 output of N2. The [1] on Q1 is applied to the CMOS relay driver N4a which operates RL1. Contact RL1 opens, removing the direct connection between the ECU and the Air Flow Sensor, resulting in the parallel combination of R1, R2, R3 and R4 in circuit. This parallel combination is calculated to provide the value of series resistance to achieve the first reduction in engine power, (Ra).

The second operation of the pager receiver output causes a further clock pulse to be produced by the same method, and the application of this to the D type register causes a [1] to be transferred from D1 to Q1, maintaining the operation of RL1, and also a [1] to be transferred from D2 to Q2 thus now operating RL2 via N4b driver. The operation of RL2 opens contact RL2 thus removing R1 from circuit, the remaining parallel combination of R2, R3 and R4 being calculated to provide the value of series resistance to achieve the second (further) reduction in engine power, (Rb).

By a similar process, reception of the third pager output applies a third clock to the system resulting in the operation of RL3. This in turn removes R2 and the resultant combination of R3 and R4 provides the third reduction in engine power, (Rc).

The fourth operation of the pager output causes contact RL4 to remove R3 from the circuit leaving R4 in circuit. The value of R4 is calculated to provide the final and lowest engine power, (Rd).

For the Bosch and Lucas LH-Jetronic injection systems the value of resistors are as per the attached table.

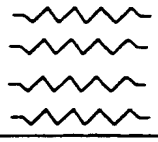
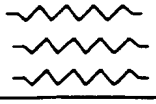
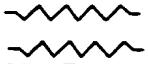
R1 (kΩ)	67				
R2 (kΩ)	67				
R3 (kΩ)	387				
R4 (kΩ)	56				
		19.9	28.2	48.6	56
		Ra (kΩ)	Rb (kΩ)	Rc (kΩ)	Rd (kΩ)

Table 1- Resistor Values

CLAIMS

1. An immobiliser for a powered vehicle, comprising:-

   means for receiving a radio signal which includes an address;

   means for determing whether the address of the signal matches an address of the immobiliser; and

   means responsive to the determining means for reducing the power deliverable to propel the vehicle.

2. An immobiliser as claimed in Claim 1, wherein the power reducing means is operable in progressive stages with repeat reception of such a radio signal having a matching address.

3. An immobiliser as claimed in Claim 1, wherein the power reducing means is operable to reduce the power progressively in response to a single reception of such a radio signal having a matching address.

The Patent Office

Application No:	GB 9818193.6	**Examiner:**	Mike Davis
Claims searched:	1-3	**Date of search:**	25 January 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): G4H (HRCE, HRCS, HNEC, HNEE, HNEM)

Int Cl (Ed.6): B60R

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2309565 A	(WEBSTER) eg abstract	1
X	GB 2305216 A	(ROVER) eg abstract and page 8	1,3
X	GB 2297356 A	(HUTCHINSON) eg abstract	1,3
X	GB 2291235 A	(TUNG HANG LIAO) eg abstract	1
X	US 5742227	(ESCARENO ET AL) eg abstract	1
X	US 5448218	(ESPINOSA) eg abstract and column 4 lines 5-16	1,3

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X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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